

## A REPORT OF A WORKING GROUP OF THE BCS: CARDIOLOGY IN THE DISTRICT HOSPITAL

### 1 Introduction

1.1 During the past decade the management of cardiac patients within district hospitals has changed considerably and there have been substantial increases in activity. This report develops and updates the recommendations and service standards of the first report on district hospital cardiology published by the British Cardiac Society in 1987.<sup>1</sup>

1.2 The main influences on service requirements have been the high incidence of coronary heart disease in the United Kingdom and an increased expectation by patients for an intervention for their disease. At the same time the advent of thrombolysis and new treatments for heart failure have caused major shifts in the delivery of care away from primary care towards the hospital setting.

1.3 Another major influence has been the increasing development of subspecialisation within general medicine, a process that began in larger teaching centres but one that has now spread to district hospitals so that there is much less dependence on teaching or tertiary centres. Examples are the development of cardiac catheterisation laboratories and pacing facilities at district hospital level.

### 2 Role of the district hospital cardiologist

2.1 The first report on cardiology in district hospitals correctly predicted that there would be a steadily increasing need for cardiologists at district level.<sup>1</sup> Admissions to cardiac care units have risen steadily in the wake of a series of large studies that have demonstrated beyond doubt the benefits of thrombolysis in the context of acute myocardial infarction.<sup>2-5</sup>

Coronary artery surgery and percutaneous transluminal coronary angioplasty (PTCA) have developed substantially so that an increasing number of patients require local assessment by exercise testing and other non-invasive tests before intervention. Furthermore, it is now the policy of the British Cardiac Society to encourage properly trained district hospital cardiologists to participate in the invasive investigation of their patients.

This may occur either in a tertiary centre or in selected multipurpose vascular laboratories within district hospitals where services can be developed for a population that is large enough to justify the capital investment and to provide enough work to maintain skill levels.<sup>6</sup> About a third of all hospitals in the United Kingdom now offer a comprehensive pacing service, again a development that was predicted in the report of 1987. The work of the district hospital cardiologist has therefore developed on two main fronts. Firstly, there has been the need to provide high level care within the rapidly developing area of acute cardiac medicine. Secondly, the role in elective care has developed from that of provision of a basic screening service for patients

suitable for intervention to that of provision of highly technological diagnostic skills and therapy.

2.2 Since the first report there has been another major development in therapy that has had a significant impact on the workload of the district hospital cardiologist. Several major trials have demonstrated the efficacy of angiotensin converting enzyme (ACE) inhibitors in relieving symptoms of heart failure and increasing longevity.<sup>7-9</sup> There is therefore an increasing expectation of accurate diagnosis of this condition by echocardiography, particularly as cardiac failure has a very poor prognosis. Almost 50% of patients die within a year of diagnosis and until the advent of the ACE inhibitors the overall survival in this condition had not changed in the past 40 years.<sup>10</sup> General practitioners and other physicians therefore rightly expect specialist advice in the management of cardiac failure. The inpatient treatment of cardiac failure patients creates a demand for hospital beds that exceeds that of any other of the broadly cardiovascular diagnostic groupings. These already constitute more than 50% of all occupied bed days.<sup>11</sup>

2.3 The availability of technical facilities within district hospitals for the investigation of cardiac patients has led to the development of service departments that provide a diagnostic support service similar to that provided by an x ray department. Many of the tasks performed may be delegated to technical staff. The more complex skills and investigations require close monitoring, supervision, and overview by cardiologists. The necessary delegation of the many skills of modern cardiac investigation highlight the need for the cardiologist to be confident that quality assurance measures and continuing technician assessment and appraisal are in place. The cardiologist will also usually be responsible for ensuring that equipment specifications and staffing levels are sufficient to provide these services. The increasing demand for such services is outlined in section 3.

2.4 An important aspect of the work of the cardiologist involves close liaison with general practitioners. Long waits for outpatient consultant opinions have led to some conditions being treated only in general practice. This may be appropriately led by a district cardiologist by the use of guidelines and protocols, examples being the management of hyperlipidaemia and hypertension. In other areas—for example, coronary heart disease—a primary care assessment may be insufficient. Furthermore the pressures brought about by the internal market within the National Health Service (NHS) may encourage direct referrals from general practitioners to tertiary centres. This is not ideal because the assessment of a patient before expensive investigation in a tertiary centre is an important function of the district hospital cardiologist. Where direct referral occurs, however, it is important that the cardiologist has good liaison with the

general practitioner concerned to allow local care and investigation of the patient as far as is possible.

2.5 It is important that district hospital cardiologists play a major part in helping purchasing authorities determine the nature and size of contracts for investigation and interventional treatment of patients within their catchment population. Regrettably patients who are remote from tertiary centres are less likely to gain access to treatment, particularly for coronary heart disease, a point that is eloquently made in the report of the Clinical Standards Advisory Group.<sup>12</sup> The uptake of cardiac interventions is also materially affected by the presence of a fully trained cardiologist in the district and whether there are two consultants in the larger districts. Unfortunately there are still 44 districts in the United Kingdom that do not provide the services of a physician with a special interest in cardiology and there are 34 larger districts (> 250 000 population) that do not have two cardiologists despite the recommendations made in the Fourth Report of a Joint Cardiology Committee of the Royal Colleges.<sup>13 14</sup>

2.6 The district hospital cardiologist should also be influential in advising purchasing authorities on prevention, education and health promotion, rehabilitation, and general aspects of community care in relation to heart disease. These activities are of vital importance if the overall health gains outlined in the *Health of the Nation* are to be achieved.

2.7 The district hospital cardiologist continues to have a non-specialist role. In almost all districts recently surveyed, the cardiologist continued to take an equal share of acute general medical admissions in common with physicians from other specialties.<sup>13</sup> In many hospitals, particularly those with few physicians, it is not practical for one physician with an interest in cardiology to manage all patients referred acutely with cardiac problems. It is therefore essential that the cardiologist works in cooperation with other physicians in order to provide the full range of medical services necessary in a busy district hospital. If the cardiologist does not have sole charge of the cardiac care unit (CCU) then it is advisable for there to be an agreed protocol for the management of patients admitted to such a unit to ensure appropriate and well-informed use of the expensive drugs that form the mainstay of treatments in these areas.

2.8 Recently there has been an increasing emphasis on the development of resuscitation skills within hospitals, the ambulance service, and in the lay community.<sup>15</sup>

It is proper that cardiologists should be in the forefront of such initiatives, that they should participate in advanced life support training, and that they should advise the ambulance service through the local ambulance paramedic steering committee.

2.9 It is now expected that consultant staff should participate in audit. Several topics in clinical cardiology lend themselves to regular scrutiny and include times to thrombolysis, standards of care for patients with acute myocardial infarction, catheter laboratory complications, and complications of cardiac pacing.<sup>16-18</sup>

2.10 The district hospital cardiologist continues to have a major commitment to teaching and this is an area that is developing. The need for involvement in the training of ambulance paramedics is alluded to above. In addition, the training requirements of all grades of medical staff are becoming more formalised particularly since the closer involvement of postgraduate deans in their continuing medical education and in anticipation of the Calman report.<sup>19</sup> In particular, it is anticipated that cardiology trainees (post Calman) will be required to spend at least 20% of their training period in district hospitals.

This will have a considerable impact on the time that district hospital cardiologists will have to commit to teaching. A future requirement for consultants will be long overdue mandatory continuing medical education (CME). Another development in recent years has been the development of courses in cardiac care for nurses and many of these are now run in district hospitals. It is vital that protected time for all these important activities is available. The commitment to such activities necessarily removes the consultant cardiologist from direct patient contact and is an important factor in the recommendations on provision of consultant posts in this report (see 4.1).

2.11 The above duties of a consultant cardiologist require time which will need to be organised in as flexible a manner as possible. It is important, however, that a work plan include fixed sessions which will normally be adhered to because the work patterns of other staff will depend on them. These may include ward rounds, outpatient clinics, and laboratory commitments such as pacing, cardiac catheterisation, and echocardiography. In line with the recommendations of the Royal College of Physicians we recommend that a maximum of six sessions be so fixed.

2.12 Committed district hospital cardiologists will wish to advance their specialty by undertaking clinical research. Many vital large scale trials with universal clinical relevance could not have been completed without the participation of district hospitals. Individual research protocols with scientific and ethical validity are also to be encouraged.

### 3 Workload and facilities

3.1 The first report on cardiology in the district hospital emphasised the fact that almost as many patients die from cardiovascular causes as from all other causes put together.<sup>1</sup> Although recent trends have shown some encouraging declines in death rates from coronary heart disease in middle aged men, the overall impact of cardiovascular disease on premature death remains high and has caused considerable national concern. Targets for improvement have been outlined in the document *Health of the Nation*.<sup>20</sup> Here targets for reductions in mortality and incidence of risk factors are

defined as well as suggested areas for improvement in provision of care. This initiative, together with an increasing awareness of health matters in the community, has led to considerable increases in demand for services within district hospitals, particularly in the area of acute cardiac care. Many cardiac care units have seen admission-rates double in the past 10 years.<sup>21</sup>

3.2 Higher levels of inpatient activity and increasing levels of outpatient referrals<sup>22</sup> have had an inevitable impact on the demand for cardiac investigations.

Most hospitals report major increases in activity in exercise electrocardiography, ambulatory electrocardiography, and echocardiography. A comprehensive survey undertaken by the British Cardiac Society (unpublished data, index date 1 April 1992, referred to as "the 1991-2 survey") indicates levels of activity far higher than expected from the 1987 figures.

3.3 *Resting electrocardiography*—In 1987 most hospitals were undertaking 5000-6000 electrocardiograms per 100 000 population per year. These figures have little relevance to present day planning since many recordings are now made acutely outside normal working hours and by various types of staff so that accurate record keeping becomes impossible. It is likely that the actual number recorded, many within cardiac care units and casualty departments, is double the reported number.

3.4 *Exercise electrocardiography*—In 1987 hospitals reported that they were performing 100-199 exercise tests per 100 000 population per year and that the numbers were rising steeply.<sup>1</sup> On the basis of data received from active centres that had had facilities for several years, it was predicted that a more realistic provision would be 300 tests per 100 000 population per year. This has proved to be an underestimate. Exercise testing figures from the 1991-2 survey show a threefold variation by region from 158 tests per 100 000 population per year (South Western Region) to 502 per 100 000 per year (Oxford Region). Exercise testing is now commonplace in the assessment of all patients presenting with angina. Exercise testing is also routinely performed after myocardial infarction although the role of such tests in predicting short-term morbidity and mortality is questioned.<sup>23</sup> As both of these conditions are presenting to hospitals with increasing frequency, it is likely that this level of provision will need to increase further to more than 400 tests per 100 000 per year.

3.5 *Ambulatory ECG monitoring*—The provision of this technique in district hospitals is essential and should include patient-activated recording devices for the detection of infrequently occurring arrhythmias in addition to 24 hour recorders.

In 1987 recordings were being performed at a rate of 100-199 per 100 000 population per year. In the 1991-2 survey the range reported is 182 (Northern Region) to 388 (Wales). The rate required will generally need to be in excess of 300 per 100 000 per year in order to provide an adequate district service.

3.6 *Echocardiography*—The provision of cross sectional echocardiography combined with Doppler facilities and colour flow

imaging should now be regarded as the norm within district hospitals.

The equipment has broad applicability and is useful in the diagnosis and assessment of a wide range of cardiac disorders. It is also cost-effective in comparison with invasive methods. The number of investigations performed in district hospitals is rising and at a rate that is more rapid than that predicted in the first report. Very few districts performed more than 200 echocardiograms per 100 000 population per year in 1987.<sup>1</sup> The range in 1991-2 was 291 (Northern Region) to 636 (North West Thames region). Many districts with consultant cardiologists in post are now performing 800 investigations per 100 000 population per year. This provision would now seem to be a minimum appropriate level, partly because of the increasing emphasis on accurate diagnosis of cardiac failure by echocardiography rather than by chest x ray alone. The newer techniques such as transoesophageal echocardiography are likely to spread to district hospitals as cardiologists trained in the procedure are appointed to such posts. Hospitals without transoesophageal echocardiography need to have access to it.

Continuing education and training are vital for echocardiographers. Recommendations for training in the United Kingdom have now been published.<sup>24</sup>

3.7 *Nuclear cardiology*—There was brief mention of this type of diagnostic technique in the first report. Since then the technique has found favour within some district hospitals: 38% of hospitals in the 1991-2 survey offered nuclear cardiac investigation, although this ranged from 17% in Mersey to 60% in the Northern region. Myocardial perfusion imaging provides a useful enhancement of exercise testing in selected patients. It is recommended that all larger district hospitals should have scintigraphic imaging, preferably single photon emission tomography (SPECT). Radionuclide ventriculography (RNV) is another valuable technique used either at rest or during exercise to assess left ventricular function.

ACE inhibitor treatment of patients with RNV documented left ventricular dysfunction after myocardial infarction and in stable coronary artery disease reduces mortality and progression to overt heart failure.<sup>25,26</sup> Since the diagnosis of heart failure is an important issue and may lead to long-term and costly drug therapy, accurate diagnostic techniques are essential. RNV provides such information in patients with non-diagnostic quality echocardiograms, but quality control of radionuclide scanning is of great importance. In hospitals without nuclear facilities contracts should be in place to allow referral to other centres as appropriate. Where nuclear cardiac investigations are provided it is vital that consultant cardiologist input is an integral part of the reporting process.

3.8 *Coronary angiography and cardiac catheterisation*—It is now becoming commonplace for district hospitals to develop their own cardiac catheterisation facilities. This topic has been addressed in detail in a British Cardiac Society Council Statement.<sup>6</sup> In essence the professional view is that it is safe to undertake coronary angiography and cardiac catheterisation in a district hospital provided that medical, technical, and nursing staff are adequately trained in the

procedures. An important criterion for a district providing such a service is that it should provide services for more than one district to ensure that there is a sufficient throughput to maintain local skills and to ensure cost efficiency. The equipment specification should be such that the image quality is at least as good as that obtained in tertiary centre laboratories. Close links should be developed with cardiac surgeons and interventional cardiologists in order to review all potential cases, establish methods of referral and waiting list priorities, and agree protocols for follow up. Despite these developments many district hospitals will not have suitable equipment or trained staff for invasive investigation. In these circumstances it is essential that close contact with a nearby tertiary centre is established and, if appropriate to the training of the local cardiologist, that investigational sessions are arranged for his/her patients at the centre. District cardiologists who do not wish to pursue invasive investigation themselves should ensure that contracts placed for patients from their own district match the volume of districts that undertake their own investigation.

Recent estimates of need from European countries with better developed cardiac facilities suggest that there should be approximately 500–600 CABGs, 400 PTCA's, 100 valve procedures, and 30 sundry operations per million population per year.<sup>27</sup>

This implies a need for 2000 cardiac catheterisations per year because the ratio of investigations to interventions is about two to one for patients with coronary heart disease and nearer one to one in patients with valve disorders and congenital defects presenting in adult life. Rather than specify exact estimates of need, because perception of need is growing at differing rates in different areas of the United Kingdom, we recommend that appropriate access times be agreed between clinicians or their representative purchasers and tertiary centres. A short-term goal should be the following:

- Outpatient access time: 1 month
- Catheterisation access time: 3 months
- Surgery/PTCA access time: 6 months

All times are the maximum acceptable. The aim should be to halve these access times within 2 years. The large requirement for emergency catheterisation and intervention should not impinge on these elective procedures. In emergency conditions such as uncontrolled unstable angina immediate access to specialised investigation is vital because complications of these conditions (death, myocardial infarction) occur within one week from diagnosis.<sup>28</sup>

**3.9 Cardiac pacing**—The first report endorsed the view that permanent cardiac pacing can be carried out safely and effectively in district general hospitals. By 1992 almost one third of all hospitals provided this service. The increased complexity of implantable pacemakers and the appreciation of the benefits that pacing or sensing of the atrium can provide make it appropriate to recommend that all hospitals providing a pacing service should have the expertise to implant atrial or dual chamber pacemakers. Budgets for pacing services should take account of the increased cost of such systems, which will be implanted in more than 50% of cases if widely accepted guidelines are followed.<sup>29,18</sup> Purchasers of the service should expect to contract at a rate that

allows for at least 300 implantations per million population per year. Most pacemaker recipients are elderly and this figure will need to be uprated if the local population has a high proportion of older people. The contract should also allow for a programme of replacement as older generators run down and should reflect the size of the existing pacemaker population of the district.

Hospitals providing a pacing service should ensure that their medical technical staff are sufficiently well trained in aspects of cardiac pacing to run a local pacemaker clinic, including monitoring of pacemaker generators, recognition of possible generator or electrode malfunction, interrogation of pacemakers using computer techniques, and programming of units to ensure optimal function and energy conservation.

#### 4 Staffing

**4.1 Consultant cardiologists**—In 1987 the British Cardiac Society recommended that each district with a population of 250 000 or more should have two consultant cardiologists, a view that was endorsed in the Fourth Report of a Joint Cardiology Committee of the Royal College of Physicians of London and the Royal College of Surgeons of England in 1993.<sup>1,14</sup> In 1984 57 districts out of 206 in England and Wales lacked a physician with a cardiovascular interest.<sup>30</sup> There had been little improvement by 1989 when 44 of 203 districts had no cardiologist and only 12 of the 62 larger districts had two.<sup>31</sup> There has been little change in the intervening years.<sup>13</sup> One hundred and fifty five consultant appointees in district hospitals would be needed immediately to meet the modest targets of the 1987 report.

In the light of the developments outlined above, the reduction in junior doctors' hours, the changes in junior doctor training, the planned reduction in the number of trainees as well as the pressures of audit and the internal market within the National Health Service, the working group recommends that there should be one physician trained in cardiovascular medicine for every 100 000 of population. This level would still leave the United Kingdom well short of the provision considered appropriate in equivalent European countries.

**4.2 Junior medical staff**—It is normal for each consultant cardiologist in a district hospital to be supported by a pre-registration house physician and at least one middle grade doctor. As the number of consultant appointments increases, it may well be necessary for consultants to work in teams and to share junior staff.

A valuable contribution to the team supporting the consultant in many hospitals is provided by the clinical assistant. In many instances this is a general practitioner.

Remuneration is poor, however, and there is often managerial resistance to appointing these doctors to the more highly paid hospital practitioner grade. We recommend that such posts should be encouraged and properly funded. Many practitioners develop skills in investigation or treatment, for example in cardiac pacing, and they provide much needed continuity in the service that is not provided by rotating junior medical staff.

For junior medical staff, it is certainly appropriate for doctors at senior house offi-

cer level to gain experience and receive training in general cardiology and coronary care as provided in district hospitals. It is also envisaged that training schemes for cardiology trainees, both at registrar and senior registrar grade, will include attachments at district hospitals where a combination of experience and training in acute general medicine may be obtained together with general cardiology.<sup>32</sup> Indeed it is likely that rotations for cardiology trainees will involve district hospitals that have invasive facilities and that early training in coronary angiography and cardiac pacing will be obtained in such hospitals.

**4.3 Technical staff**—Medical staff (MTOs), previously called physiological measurement technicians, and assistant technical officers (ATOs) are of vital importance to any cardiac department, where they are responsible for much of the routine activity. They are, in addition, responsible for the supervision and organisation of highly technical and complex procedures that require a high level of skill and training. In many departments technicians carry out and report complex investigations such as echocardiography and electrocardiography in all its various forms and as such are an important adjunct to the consultant cardiologist in providing a diagnostic service within a district. They are also responsible for the bulk of the pacemaker service (see 3.9).

Despite the introduction of National Vocational Qualifications (NVQs), we hold firmly to the view that cardiac technicians require a dedicated training that sets them apart from some other technical staff employed in hospital. We endorse the previously stated recommendation that there should be 7 MTOs per 250 000 population although the skill mix may vary depending on the degree of specialisation within the unit. Training, monitoring, and supervision remain a responsibility of more senior technical staff and the consultant.

**4.4 Resuscitation training officer**—The Royal College of Physicians jointly with the British Cardiac Society have strongly recommended that such an officer is in post in all large district hospitals.<sup>33</sup> This appointee should be responsible not only for training but also for audit of resuscitation skills.<sup>34</sup> A certification scheme is strongly recommended. Hospitals have been slow in implementing these proposals. The British Heart Foundation has recently offered 50% financial support in the first 2 years for resuscitation training officers. This action underlines the necessity for such appointments. A part time appointee is inappropriate—such post holders usually do not have resuscitation training as their primary job commitment.

The ultimate goal of the full time holder of such a post should be the training in basic life support of the majority of hospital staff including ancillary staff. Despite recent concerns about the value of cardiopulmonary resuscitation skills<sup>35</sup> there is good evidence that resuscitation training helps to save lives, both in and out of hospitals.<sup>36,37</sup>

**4.5 Cardiac rehabilitation support staff**—A position statement of the British Cardiac Society on the need for cardiac rehabilitation has been published.<sup>38</sup> Quality guidelines of most health purchasing commissions (equivalent to district or regional health authorities) insist uniformly on appropriate discharge, follow up, and

support arrangements for patients with commonly encountered diseases. There is a considerable body of evidence for the efficacy of cardiac rehabilitation programmes.

Appropriate personnel who should be involved include physiotherapists, specialised cardiac nurses, dietitians, pharmacists, health visitors, and social workers. Other health care personnel who can address the psychological problems experienced by patients with cardiac disease are needed too. Patients who are identified as "low risk" may not need to reattend the district hospital after discharge but may be suitable for programmes run from community hospitals. The newly formed British Association for Cardiac Rehabilitation has undertaken to produce guidelines for programmes, but the key points of the cardiac rehabilitation process are:

- It should start in hospital and transfer smoothly to the post hospital period
- It should be comprehensive, embracing all aspects of risk factor modification and not just exercise
- Patients who have had cardiac surgery or angioplasty can benefit as much as patients who have had a myocardial infarction.

Patients with coronary artery disease who do not fit in the categories above can benefit from the rehabilitation process and spouses, partners, and relatives can be influenced by the trickle down effect of a rehabilitation programme, which is therefore an aid to health promotion (primary prevention) as well as to the secondary prevention of complications of coronary artery disease.

**4.6 Nursing staff**—There are no national or regional criteria for nurse staffing levels in cardiac care units in the United Kingdom. There is wide variation in nurse staffing in terms of numbers and grades, including the number qualified in the specialty which is often unrelated to activity and dependency information. This may be due in part to the nature, size, and layout of units.

Most units are separate wards but in some cases CCU beds are part of larger or specialised wards and combined cardiac and intensive care units usually have better staffing levels.

A recent report from the Institute of Manpower Studies represents the first census by an objective body of nurse staffing in CCUs.<sup>39</sup> The sample comprised 105 CCUs. Responses came from 86 NHS districts and one special health authority. The median number of beds was five or six. Myocardial infarction—definite or suspected—and angina accounted for 75% of admissions. Average midnight bed state was 80%. One third of patients were reported to have had a dependency ratio of 0.5:1 or less. Two thirds of patients were reported to have had dependency ratios of 1 nurse:1 patient or less. In the two thirds of units that had between 3 and 10 CCU beds the average staff:bed ratio was approximately 2.5:1. Three quarters of units had a ratio of 3 staff per bed or less. Increasingly intensive management of patients with unstable angina pectoris or myocardial infarction leads us to recommend that the median ratio of 2.5 whole time equivalent nursing staff per bed in a cardiac care unit is appropriate.

This, however, may need to be modified. Units with no invasive facilities and relatively simple monitoring practices may need fewer than this whereas units acting as referral centres with high proportions of patients requiring Swan-Ganz catheterisa-

tion, arterial pressure monitoring, and intra-aortic balloon pumping may need more.

We recommend that wherever possible separate nursing establishments exist for cardiac care units and for intensive care units. The specialties are very different.

Nurses' roles have changed in response to external pressures such as the reduction in junior doctors' hours, increase in patient activity, increase in involvement with new technologies, and an emphasis on the importance of cardiac rehabilitation, including the provision of community support.

The roles of senior nurses have also changed. These nurses are increasingly assuming budgetary control, determining standards, undertaking audit, and becoming computer literate, often with the consequence that they are further removed from direct patient care. To ensure that expert, high quality nursing care is delivered, the nursing team should be led by a specialist practitioner, such as a clinical nurse specialist or advanced nurse practitioner in coronary care nursing. Guidelines for medical practice should be drawn up and supervised by the consultant cardiologist and clinical care should be supervised by him or her. There should be adequate provision of auxiliary and clerical support and information technology training and resources, so that clinical nurses devote most of their efforts towards direct patient care.

**4.7 Secretarial staff**—Adequate secretarial support is vital to the success of both the cardiac department and hospital. Secretaries should feel a sense of identity and commitment to the goals of the unit. Many of the activities of such staff necessarily involve organisational and decision making skills well beyond that of typing. The consultant should be supported by a secretary with personal assistant (PA) skills and other staff should also be well supported as regards typing and clerical work. Only if hospitals commit adequate resources to this area will patients receive the service that we would wish.

## 5 Structure of district hospital cardiac services

**5.1 Investigative facilities, office space, and storage facilities** should be conveniently housed in a single area of the hospital. Conflicts will arise because certain facilities—for example, electrocardiography—may be more convenient to locate near the outpatient department whereas others such as cardiac care units or medical wards (for example, echocardiography) may be more conveniently located near to inpatient beds.

The most convenient location is probably close to the cardiac care unit so that echocardiography can be performed here rapidly in an emergency and if treadmill testing is supervised by a technician specialised nursing staff skilled in resuscitation will be immediately available. No single solution is ideal for all hospitals.

We recommend a floor area of 300 m<sup>2</sup> as a minimum requirement. This should be made up of rooms for routine electrocardiography, stress electrocardiography, echocardiography, placement and analysis of ambulatory electrocardiography devices, storage, reception and technician office, consultant and junior medical staff office, and secretarial office.

Ideally there should be space for teaching and training and if facilities for resuscitation

training, education, and cardiac rehabilitation are to be provided then a location within the overall cardiac department complex is desirable. Units that undertake more complex activities such as cardiac pacing, transoesophageal echocardiography, and cardiac catheterisation will also require additional space.

**5.2 Cardiac care unit**—The most efficient size for such a high-dependency unit is probably between six and eight beds. Individual requirements for monitoring at each bed will vary. Modular systems offer advantages of flexibility.

The numbers of elderly patients admitted to CCUs and of patients who might formerly have been treated at home are increasing. We therefore recommend that four rather than three, CCU beds per 100 000 population is appropriate. Minor variations are acceptable, depending on the local standardised mortality ratio.

All units that manage acute myocardial infarction should have facilities for intensive monitoring at one or two beds. These should include recording of dual intravascular pressure tracings, ECG, and other parameters routinely measured in the critically ill. Patients with unequivocal myocardial infarction will need to be fast tracked to achieve the Health of the Nation target for thrombolytic therapy (where no contraindication exists) within 30 minutes of arrival in the hospital. Units will generally accept a wide variety of acute cardiovascular conditions and not be restricted simply to acute myocardial infarction. Automated arrhythmia detection is highly desirable.

A separate procedures room, protected against radiation scatter, is necessary for the immediate placement of temporary transvenous cardiac pacing electrodes. Such a room may also be conveniently used for other procedures such as right heart catheterisation, placement of pulmonary artery flotation catheters, and pericardial aspiration. Facilities for immediate resuscitation, defibrillation, temporary cardiac pacing, and assisted artificial ventilation are essential. It is undesirable to ventilate patients on a cardiac care unit and a close relation should be established with the intensive care unit for patients who need ventilation. Many intensive care units will be closely linked to cardiac care units.

**5.3 Medical beds for cardiovascular patients**—Larger cardiac care units should have progressive care areas where patients who need less intensive monitoring can be nursed. Constraints will operate in different hospitals. Some may prefer cardiac patients to be managed on all medical wards whereas others may prefer to concentrate cardiac patients in specific medical wards.

Suitable policies for progressive rehabilitation and visits from a cardiac nurse for education, counselling, and induction into rehabilitation programmes should, however, be in place wherever cardiac patients are subsequently nursed.

## 6 Logistics of cardiac care

**6.1 Purchasers and providers**—require a contracting mechanism that is financially equitable and does not restrict the type of patient care that is provided. Block contracts on the basis of finished consultant episodes are crude and because of exclusions are by definition not able to encom-

pass the complete range of patient care available. They also do not provide a mechanism to monitor the type of care that is provided nor give any indication of either changes in practice or case mix.

There is a tendency therefore to concentrate on high cost procedures and to make contracts for specific numbers of these. The main difficulty with this approach is that the management of a specific patient often cannot be predicted especially when more than one treatment method is available. The types of treatment may have quite different resource consumption implications.

A good example of this is the treatment of patients with unstable angina who may settle and be managed medically after control of symptoms, but may also undergo procedures such as coronary arteriography and coronary angioplasty or coronary bypass surgery.

The National Casemix Office is currently revising Healthcare Resource Groups (HRG) the use of which will greatly help these problems. There are approximately 40 groups per specialty each of which is intended to be clinically meaningful and homogeneous in resource consumption. They are based on diagnostic and procedure codes and length of stay and so are dependent on good data collection.

The costs of HRGs can be assessed either "top down" or "bottom up". The latter has the great advantage of identifying potential economies but either way provides an informed method for both purchasers and providers to monitor costs and to negotiate sensibly.

In view of the unpredictability and changes in methods of patient care the case mix will vary. We strongly recommend that district hospitals move towards identifying costs separately for cardiology services in DGHs. Purchaser and provider might agree costs for the various HRGs (and their component parts) and the contract price for each specialty on the basis of the case mix for the previous year. The contract could then be monitored by both and modifications made as the contract proceeded.

**6.2 Open-access services**—There is considerable pressure from purchasers (GPs, health purchasing commissions) for improved access for some or all cardiac services, but the provision of open-access services may encourage indiscriminate use of diagnostic services. There is therefore a potential for waste of scarce resources. Nonetheless if this results in a useful yield of patients with significant disease who require further investigation and/or treatment, then these services can be justified. Frequently, however, open-access services are provided simply because the workload is too great for every individual case to be referred to the cardiologist.

If such services are to be provided,—for example, exercise treadmill testing—then the cardiologist should issue appropriate guidelines and oversee the service.

There is evidence to suggest that this approach, although valuable to the individual practitioner, has limitations in that GPs tend to use the service to exclude coronary artery disease in patients who are already at low risk. The predictive value of exercise ECG testing in such patients may be poor. We do not recommend the expansion of open-access services as a way of avoiding the involvement of an experienced clinician.

This committee recommends as before

that open-access electrocardiography is not appropriate. ECGs should be recorded in GP surgeries if indicated (see 6.4).

The committee considers it undesirable to provide open-access services for echocardiography and ambulatory electrocardiography, although good communication between GP and consultant should allow use of the test for the GP in selected cases. The ideal should remain a specialist opinion for most cases referred. A non-invasive cardiac test result separated from clinical consideration of the patient is poor medical practice and may be misleading or dangerous.

Undiagnosed chest pain, however, is a common clinical problem where immediate advice and correct management are important. Consideration should be given to the provision of a medical chest pain clinic run daily by medical staff with sufficient experience to assess patients and decide on treatment strategy. The correct management of suspected acute myocardial infarction, however, remains immediate admission to hospital for potential thrombolytic therapy.

**6.3 Prevention of cardiac disease**—Increasing attention is being paid to the management of conventional cardiac risk factors and district hospitals should provide facilities so that patients with lipid disorders in particular can be advised and treated. This may mandate a separate lipid clinic or the cardiologist may choose to do this from within the general outpatient clinic. Cardiologists should be leaders and local opinion formers in strategies for both primary and secondary prevention of coronary artery disease. These activities represent important avenues for local health promotion.

**6.4 General practitioner links**—General practitioners uniformly express a need for improved communication with hospital staff. A particular time of the week set aside for incoming calls may be appropriate.

Fax machines are useful for facilitating rapid communication. An open-access general practitioner ECG service is not desirable. General practices should have their own ECG recorders. Tracings that are puzzling can be faxed to the cardiac centre for a further opinion.

Improved communication from CCUs should be facilitated by good liaison between the cardiac care unit and the primary health care team. General practitioners (including fundholders) should no longer need to refer patients directly to a tertiary centre if there is an adequate investigational service in the district hospital.

Outreach clinics can be effective in some medical specialties but we do not support their use in cardiology because many patients require more detailed cardiac investigation than can usually be provided at a peripheral clinic.

**6.5 Elderly care patients**—Previous studies of myocardial infarction in the elderly tended to emphasise the importance of management of the patient in their own environment.<sup>40</sup> Hospitals can be a disorientating experience for the very elderly. Nonetheless, the saving of lives by the implementation of thrombolysis in elderly patients with myocardial infarction mandates the early treatment in hospital of many of these patients. Absolute mortality is highest in the elderly and the prompt application of thrombolytic therapy for these patients is

important.<sup>41</sup> It is highly desirable that coronary care units have no age bar for the management of acute myocardial infarction. If this is not possible then attention must be paid to starting thrombolysis elsewhere, and particularly to rehabilitation arrangements for the very elderly.

**6.6 Early management of acute myocardial infarction**—Valuable guidelines on this subject have recently been published by the British Heart Foundation Working Group.<sup>15</sup> These emphasise the continuum of management from the first call for help to the administration of thrombolytic and other early therapy. Hospitals are obvious areas for improving the "door to needle time" for thrombolytic therapy but without careful organisation of a rapid response service the overall "call to needle time" may be jeopardised. None the less, cardiologists have an immediate and personal responsibility for meeting the 30 minute door to needle time required by the *Health of the Nation* document.<sup>20</sup>

Recent studies comparing pre-hospital and hospital thrombolysis have emphasised that where transfer time to a hospital in an urban area is short, there may be more to be gained from re-organisation of hospital management of myocardial infarction patients than pre-hospital administration of thrombolytics.<sup>42</sup> This is not the case in rural areas, however.<sup>43</sup>

Cardiologists with responsibility for rural areas should liaise with ambulance paramedical services to discuss how myocardial infarction in patients seen in remote areas should be managed. This may include the pre-hospital administration of thrombolytics. This committee strongly believes that an electrocardiogram is important for the following reasons:

- The electrocardiogram may be normal and may therefore draw the attention of the interventional team to the possibility of another diagnosis.

- If the diagnosis is myocardial infarction then a normal electrocardiogram indicates that the patient is in a low risk group and there may therefore be hazards from the administration of a thrombolytic.<sup>44</sup>

- If the electrocardiogram is normal and the diagnosis is myocardial infarction then streptokinase (the cheapest thrombolytic) may not be administered, and may therefore be conserved for a possible future occasion when the same patient may suffer a substantial myocardial infarct.

- Finally, if the myocardial infarction is very early the administration of a thrombolytic may restore the electrocardiogram completely to normal, despite clear cut cardiographic evidence of hyper-acute infarction.

In this circumstance the diagnosis when the patient is eventually admitted to hospital and followed in hospital may remain in doubt and the patient may require subsequent coronary angiography to prove or disprove the presence of coronary artery lesions. If no electrocardiogram has been performed this problem may be quite common.

In most developed countries except for Great Britain and the United States a medically manned ambulance for the immediate management of patients with myocardial infarction is the norm. This probably represents the best possible care for such patients. Where these facilities exist in the United Kingdom (notably in Northern



Ireland) they should be supported and sustained.

It should constantly be borne in mind that immediate thrombolytic therapy, though important for the obvious case with no contraindications, is not always the correct management of the patient with an acute presentation. Careful history and examination, and often the taking of two or more sequential electrocardiograms, together with other tests such as chest x ray, echocardiography, or even serum amylase, may be the correct approach in difficult cases.

## 7 Conclusions

Major changes in the structure of the NHS have occurred since the first report on cardiology in the district hospital. Pressures to diagnose and treat more patients have increased without a commensurate increase in staff and facilities. The district hospital cardiologist has a vital part to play in optimising care of patients. The move of highly trained cardiologists to district hospitals has led to a devolution of advanced techniques previously the province of regional cardiothoracic centres. This will probably continue. It is important that the district hospital cardiologist is not seen purely as a medical technician. There will always be a need for consultant cardiovascular physicians with clinical skills who provide a high standard of patient care.

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The group acknowledges the contributions provided by discussion with R Balcon, J Birkhead, DA Chamberlain, KAA Fox, MD Joy, DJ Parker, K Reval.

We thank Ms E B Rogers for secretarial support.

Reprints are available from: British Cardiac Society, 9 Fitzroy Square, London W1P 5AH.

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